Transition Plan for System Security

Maintaining system security through the energy transition

5 December 2025

We acknowledge the Traditional Custodians of the land, seas and waters across Australia. We honour the wisdom of Aboriginal and Torres Strait Islander Elders past and present and embrace future generations.

We acknowledge that, wherever we work, we do so on Aboriginal and Torres Strait Islander lands. We pay respect to the world's oldest continuing culture and First Nations peoples' deep and continuing connection to Country; and hope that our work can benefit both people and Country.

'Journey of unity: AEMO's Reconciliation Path' by Lani Balzan

AEMO Group is proud to have delivered its first Reconciliation Action Plan in May 2024. '*Journey of unity: AEMO's Reconciliation Path*' was created by Wiradjuri artist Lani Balzan to visually narrate our ongoing journey towards reconciliation – a collaborative endeavour that honours First Nations cultures, fosters mutual understanding, and paves the way for a brighter, more inclusive future.

Read our RAP

How to interact today

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- Please ask questions using Slido: www.slido.com Enter: #AEMO
- Enter with your name, no need to log in.
- Ask your questions or up-vote others' questions.
- We will also have an engagement survey following the webinar for stakeholder feedback.

Today's agenda

Time	Item	Speaker
10:30 am	Acknowledgement and agenda	Angela Heck, Stakeholder Engagement
10:35 am	Introductory remarks	Nicola Falcon, Executive General Manager, System Design
10:40 am	AEMO 2025 Transition Plan for System Security	Chris Mock, Bjorn Sturmberg, Engineering Strategy
11:15 am	Q&A	Niraj Lal, Engineering Strategy
11:50 am	Closing remarks	Chris Davies, Group Manager, Future Energy Systems
11:55 am	Survey and close	Angela Heck, Stakeholder Engagement

Introduction

Nicola Falcon, EGM System Design

Context

NEM Planning and Analysis

Data Infrastructure Reliability Security

March 2024
ISF rule change

Dec 2024
Initial TPSS
Engineering Roadmap
resourcing uplift

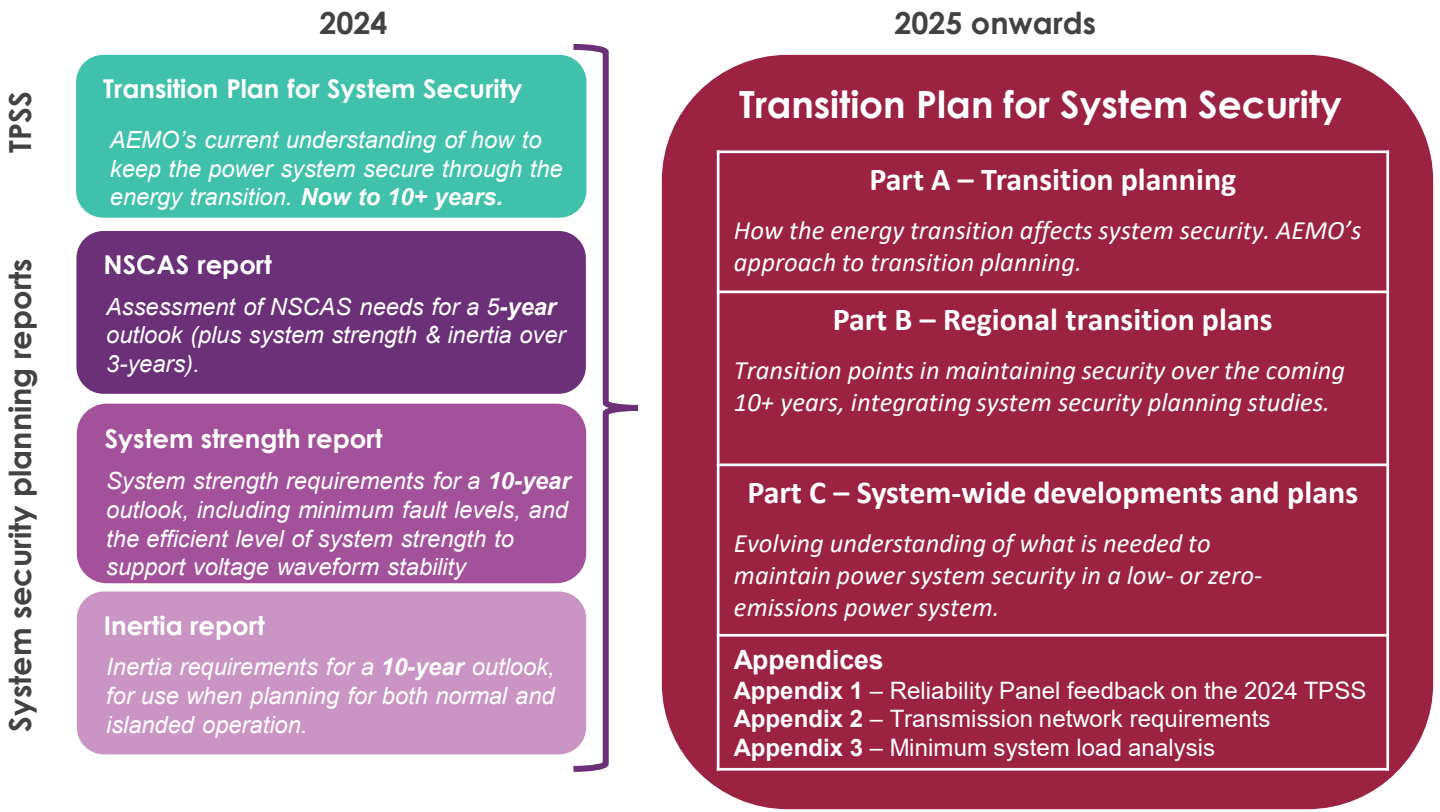
Dec 2025
TPSS
(incl. System
Security Reports)

Annually updated
Further report
consolidation

2025 Transition Plan for System Security

Chris Mock and Bjorn Sturmberg
Engineering Strategy

AEMO's combined security reports

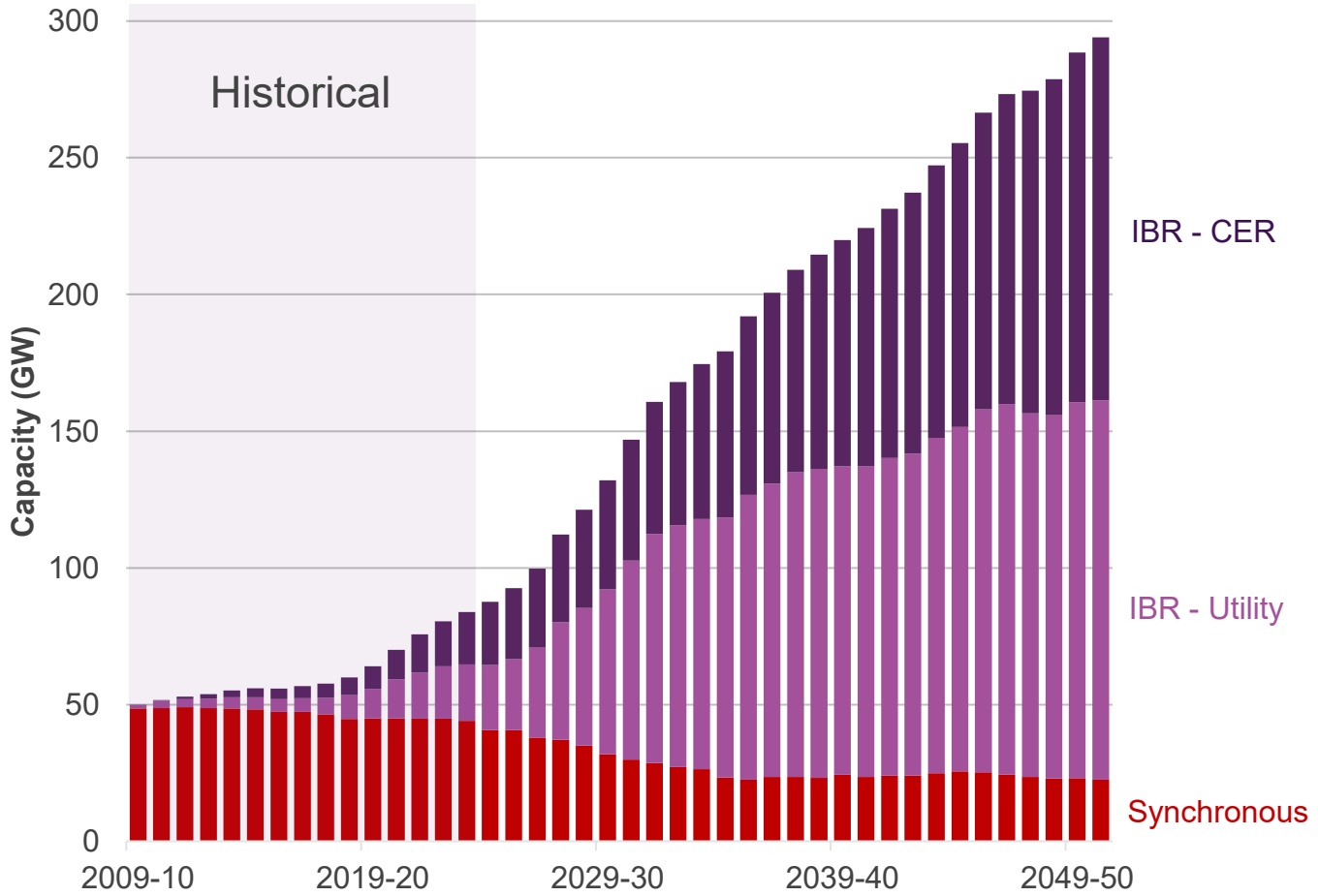


AEMO encourages feedback on the 2025 TPSS, email futureenergy@aemo.com.au by 2 February 2026. Feedback will be published on AEMO's website.

Part A – Transition planning

Decoupling system security from coal generation

Historical and 2024 ISP Step Change scenario of synchronous generation and IBR in the NEM



Technical requirements are enduring, their provision is evolving

A ***secure*** power system is one operated safely within defined technical limits, with ability to withstand credible disturbances, return to secure operation, and restart following a widespread outage.

Power system criteria

- System strength
- Frequency and inertia
- Voltage control
- Operability
- Resource adequacy
- System restoration
- Transient and oscillatory stability

AEMO is procuring transitional services

1. To address near-term challenges, and
2. To trial new approaches to maintaining power system security.

Services currently being procured:

- Managing minimum system load (MSL) events with battery energy storage systems
- Black start capability from inverter-based resources
- Zero synchronous generation trial
- Grid-forming inverter protection-quality fault current
- System restart under high distributed PV conditions
- Minimum system load transitional services
- South Australia grid reference transitional service

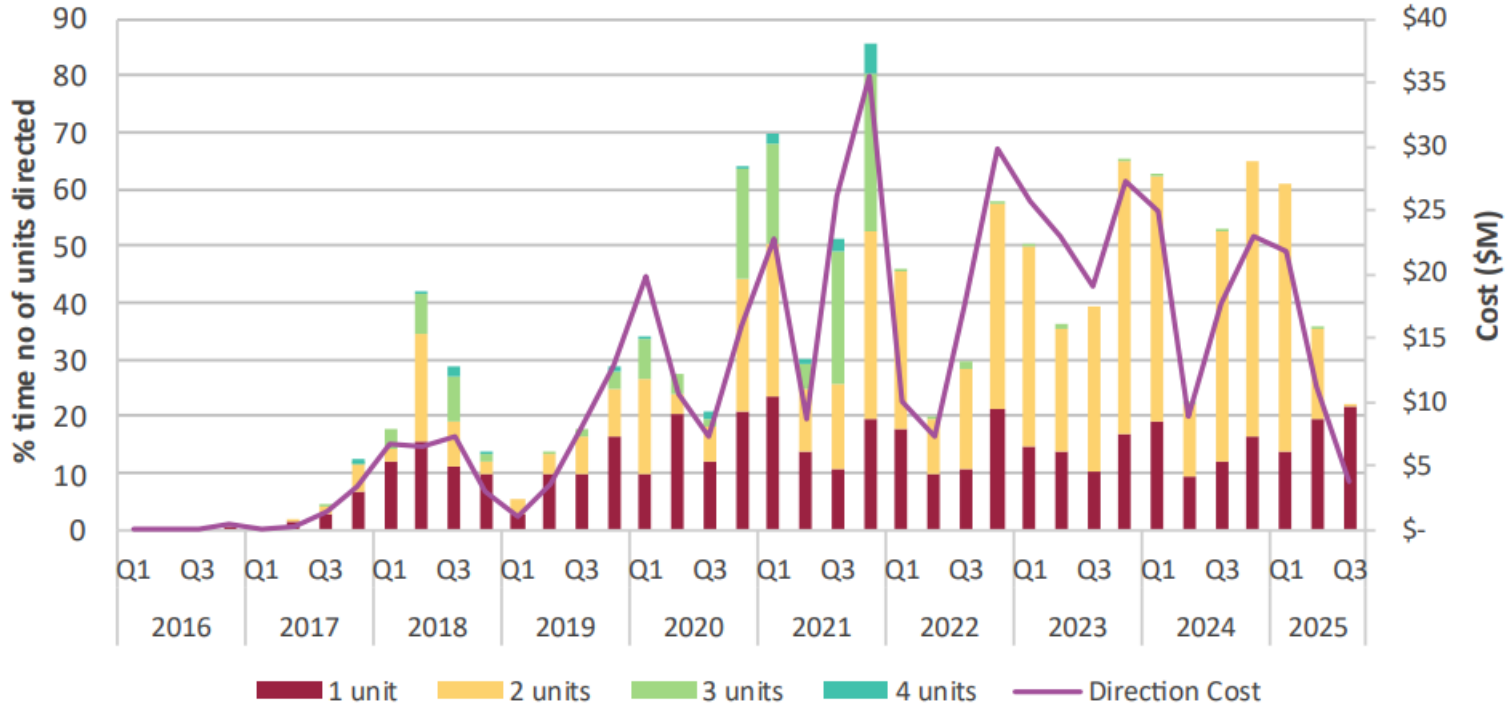
Security is a shared responsibility

Network Service Providers

Market participants

AEMO

Directions required to maintain system security in SA



Part B – Regional transition plans

AEMO's transition planning approach

Transition planning is an ongoing proactive body of work that needs to be done to ensure readiness for every transition point.

Transition points are events that require material changes in the operational approach to managing system security.

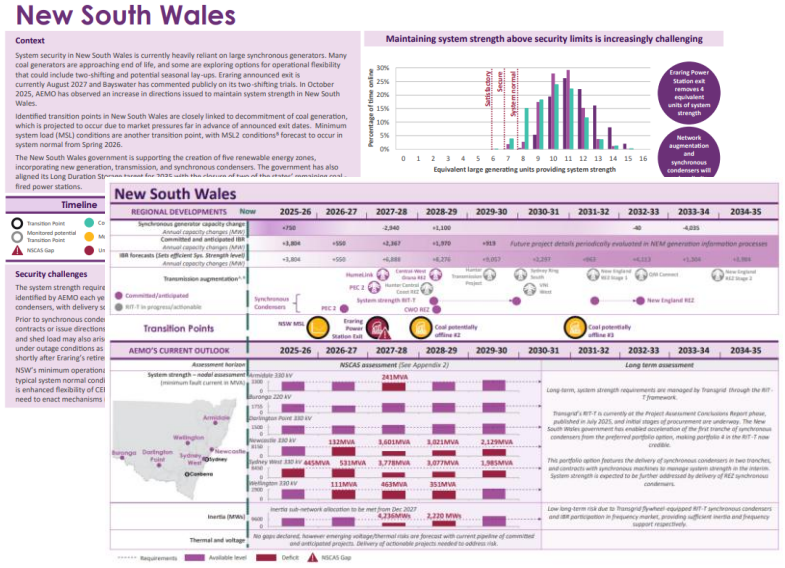
Horizon 1	Horizon 2	Horizon 3
Operational planning to prepare for imminent transition points	Transition planning in the investment timeframe	Future system needs
0-2 years	2-10 years	10+ years

Example Transition Points

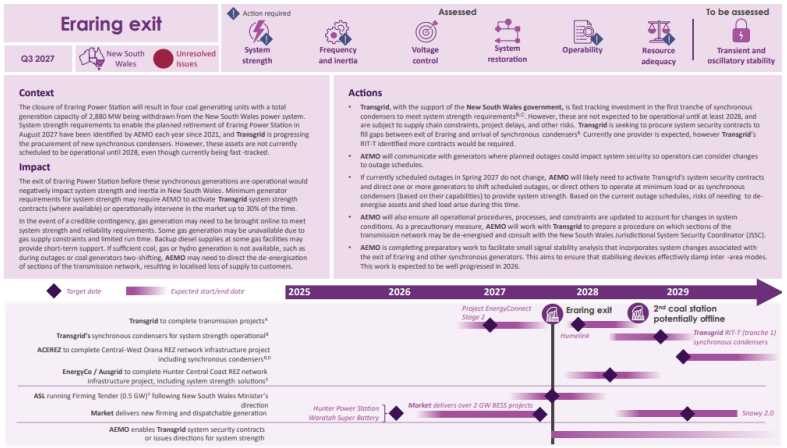
- Major asset changes such as coal power station retirement
- Threshold events, such as projected seasons where operational demand could drop below minimum levels
- Operational changes that could affect how security is maintained, such as reducing the number of synchronous generators required to be online in a region.

Navigating the regional plans

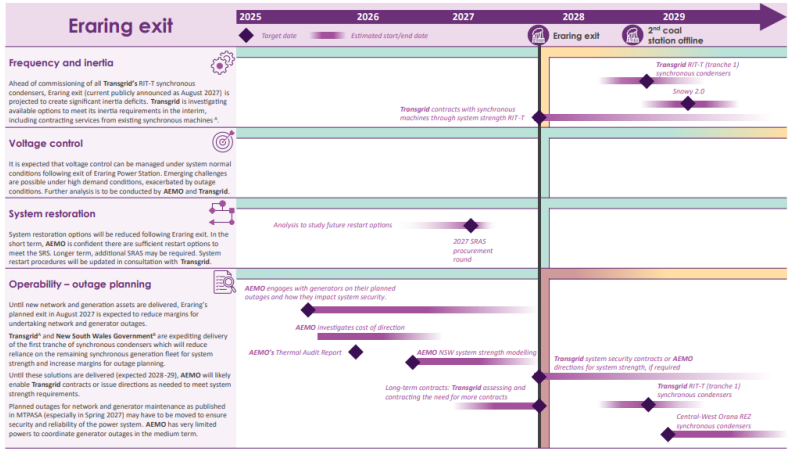
Regional transition summary



Transition point overviews



Security criteria assessment



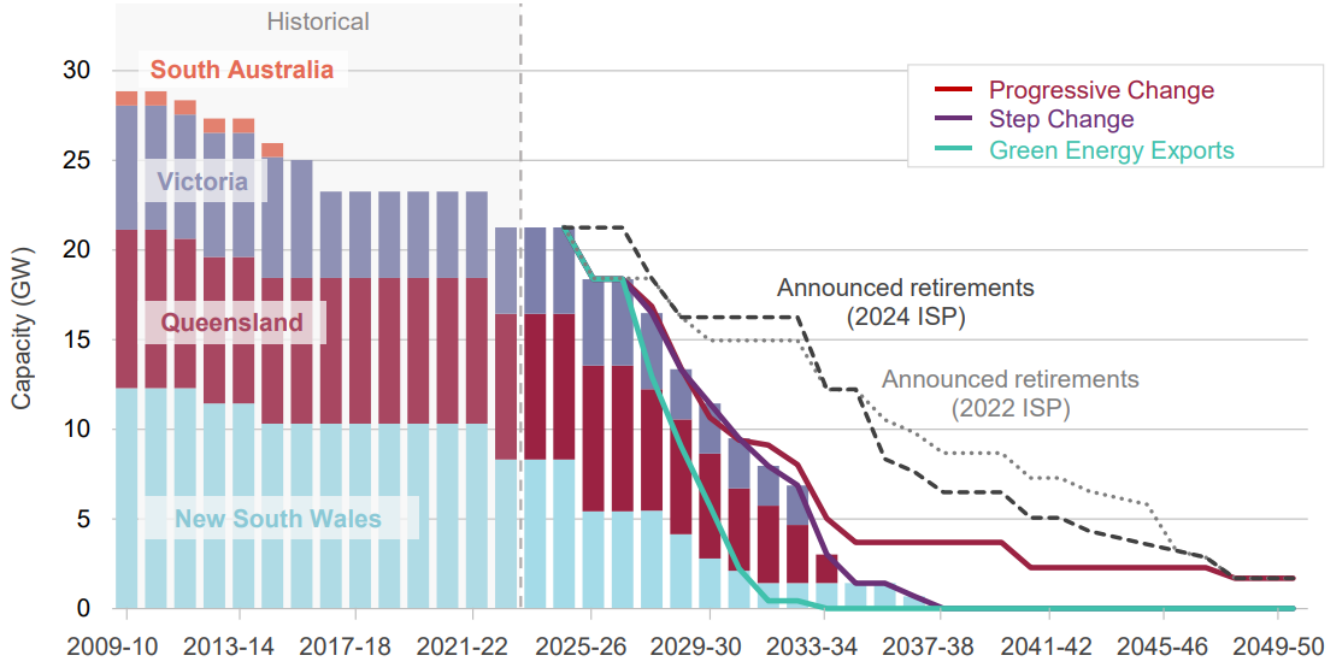
The TPSS contains eight coal transition points

Replacement services are needed well in advance of retirement – as coal stations increasingly withdraw or decommit from the power system:

- operationally for maintenance
- or commercially for hours, days or seasons

Two types of coal transition points:

- ‘Offline’ points assess readiness for temporary decommitment
- ‘Exit’ points assess readiness for permanent retirement



NEM coal capacity - 2024 ISP

Minimum System Load

Minimum System Load (MSL) refers to thresholds needed to keep the system in balance and enable generators to provide essential system services

MSL management strategies

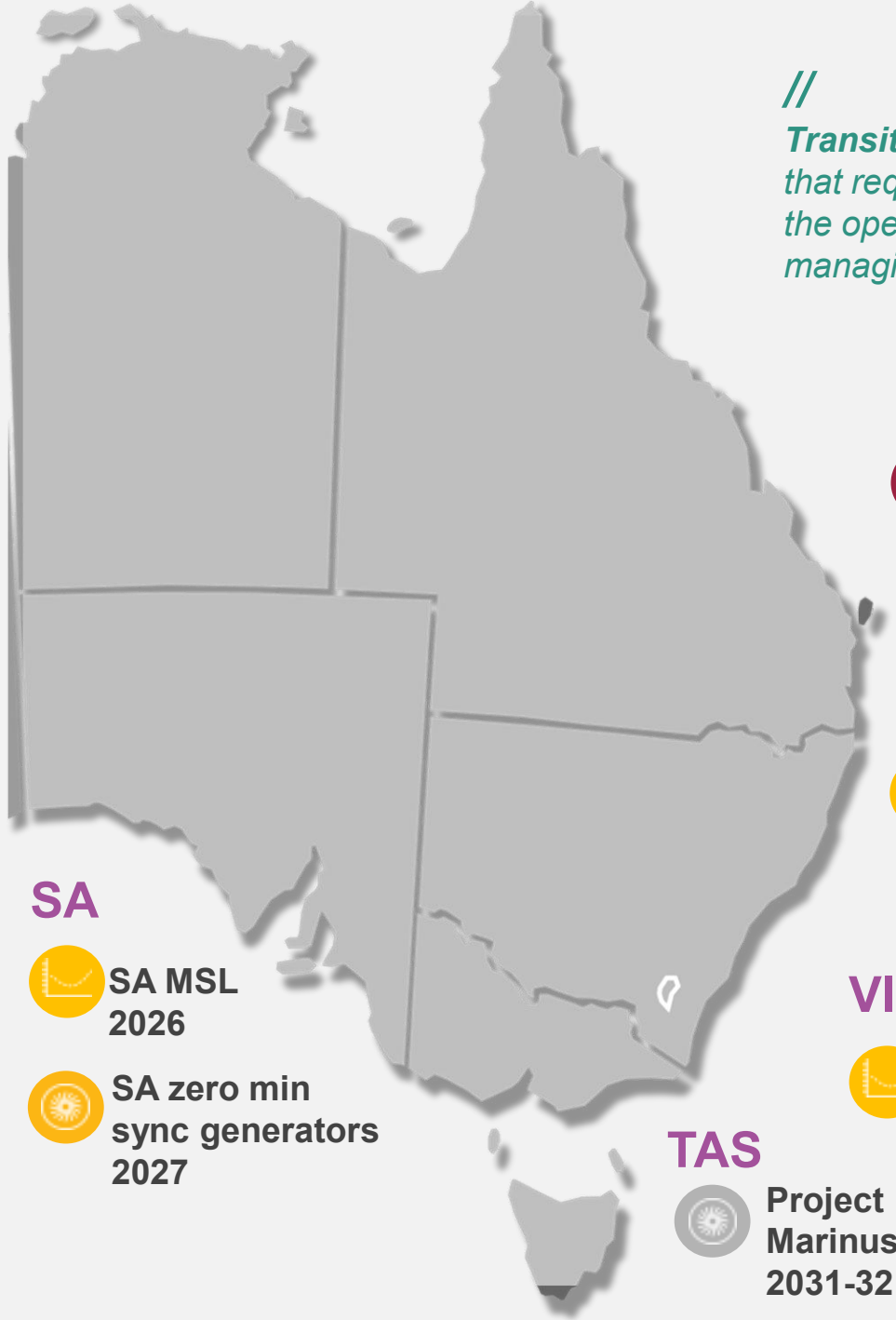
- Deploy new sources of system services
- Store energy
- Increase daytime demand
- Reduce non-essential generation

MSL operational tools

- Issue market notices
- Recall outages
- Decommit non-essential large-scale generators
- Coordinate storage through contracts or directions
- DNSP actions – e.g. controlled loads, emergency solar backstops, reverse-feeder shedding

There remains an urgent need to increase emergency backstop capacity to manage rare, but plausible, onerous system conditions. If developments outlined in the TPSS proceed and demand grows as forecast, then use of emergency backstops will remain rare.

NEM Transition Points



*// **Transition points** are events that require material changes in the operational approach to managing system security.*

Industry readiness for transition points

- Complete/on track
- Moderate readiness
- Unresolved issues

QLD

- Qld MSL 2026
- QLD 1st coal station potentially offline, 2027
- Gladstone exit, 2029

NSW

- NSW MSL 2026
- Eraring exit, 2027
- NSW 2nd coal station potentially offline, 2029
- NSW 3rd coal station potentially offline, 2031-32

SA

- SA MSL 2026
- SA zero min sync generators 2027

VIC

- VIC MSL 2026
- Yallourn exit, 2028
- VIC 2nd coal station potentially offline 2031-32
- VIC 3rd coal station potentially offline 2033-34

TAS

- Project Marinus 2031-32

Part C – System-wide developments and plans

Part C – Table of Contents

What is needed to achieve *power system security* in a low- or zero-emissions system, and the work AEMO is undertaking to improve this understanding.

Transmission level

1. Evolving operation of thermal fleet
2. Future system restart
3. Frequency control
4. Protection & control systems
5. Non-credible contingencies

Distribution level

1. **Operating a high DER system**
2. Enabling a two-sided system

Technologies

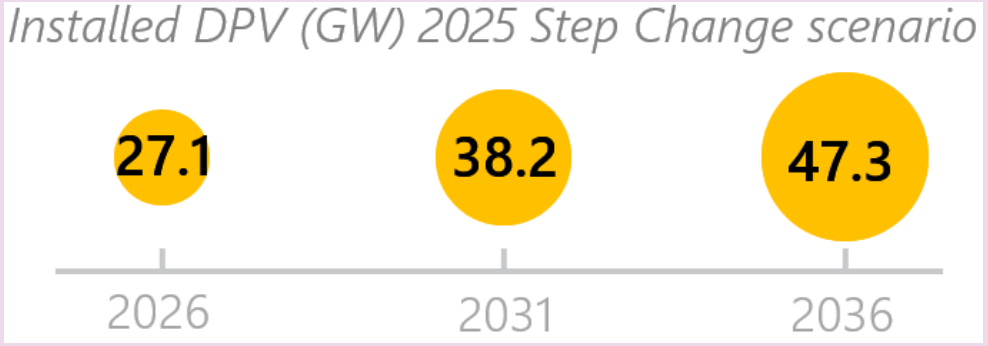
1. **Grid-forming inverters**
2. Hybrid gas turbines with clutches
3. Large inverter-based loads
4. Emerging technologies

Horizon 3

AEMO's Engineering Roadmap

Operating a high DPV system

AEMO is supporting continued growth in distributed PV (DPV) over the next 10 years.



MSL challenges are being addressed:

- management strategies are implemented
- system security is decoupled from coal.

AEMO expects new issues will arise as DPV contributions increase. The TPSS contains studies of emerging issues.

- Build high-DPV model (2031)
- Assess against system criteria and identify high-DPV implications
- Identify required further studies
- Engage with NSPs, industry, research community, international peers to prioritise and complete studies
- Integrate outcomes into system security management

Grid-forming inverters

Defining features of different inverters

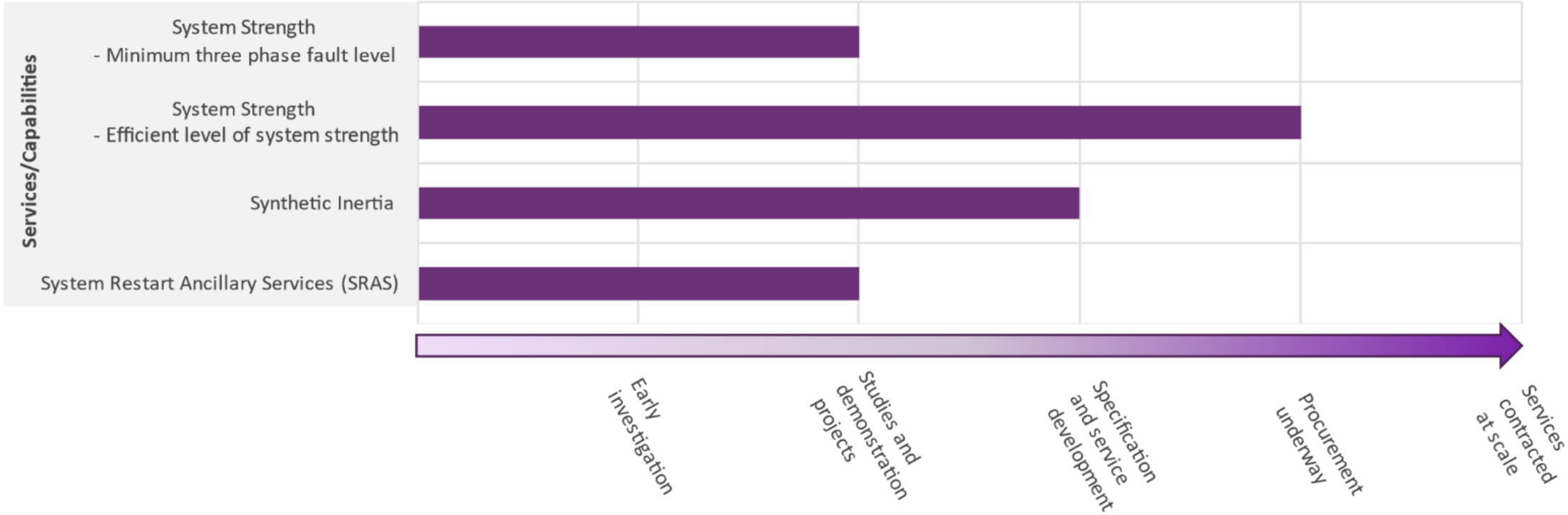
Grid-following inverters (GFL)

Control system **synchronises** to the grid voltage waveform

Grid-forming inverters (GFM)

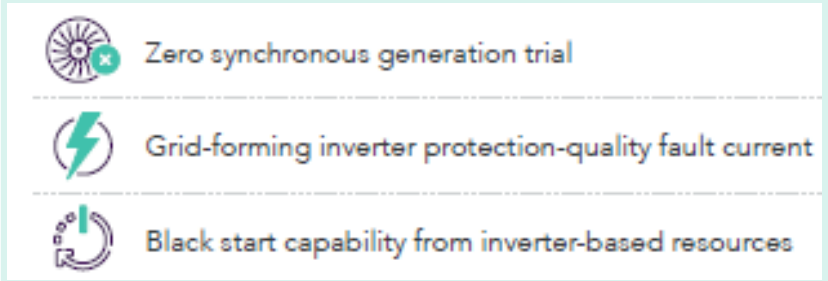
Control system **sets its own** internal voltage waveform

Progress towards delivering security services at scale



Grid-forming inverters

	2025	Forward plans
System strength – minimum fault level	**AEMO** commissioned 2 consultant reports **AEMO** survey of TNSP protection	**AEMO** studies and HIL testing (Eng Roadmap)
System strength – stable voltage waveform		**TNSP** multi-GW pipeline in RIT-Ts **AEMO** quantify contributions (Eng Roadmap)
Synthetic inertia	**AEMO** studies **AEMO** Inertia Network Services Specification	**TNSP** procurement as of 2 Dec 2025 (ISF)
System restart		**AEMO** Type 2 Transitional Service

	2025	Forward plans
Standards	**AEMO** simulation tests against GFM Voluntary Specification	**AEMC** Access Standards Review
Trials	**AEMO** Statements of Need for Type 2 Transitional Services	

Summary

AEMO 2025 Transition Plan for System Security

- Part A – Transition planning
- Part B – Regional transition plans
- Part C – System-wide developments and plans
- Appendices

Timely investments are needed to decouple reliance on coal generators for system security – enabling the next phase of the energy transition.

Q&A

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Next steps and feedback

- Draft 2026 ISP – release date 10 December 2025
- Ongoing AEMO planning, analysis and engineering activities
- 2026 Transition Plan for System Security – informed by stakeholder feedback
- Publication webinar survey

Questions

1. What was most useful in this year's Transition Plan for System Security that would be useful in future?
2. What additional information would help stakeholder decision-making on investments that support system security?
3. Where is additional effort required to maintain system security while transitioning to higher contributions of renewables?
4. How best should Engineering Roadmap content be merged and balanced with the system security information in the next Transition Plan for System Security?
5. Do you have any feedback on how AEMO can/should continue to engage on technical matters?

Interested stakeholders are encouraged to submit responses to futureenergy@aemo.com.au by 2 February 2026.

For more information visit

aemo.com.au